



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: April 16, 1997

In reply refer to: A-97-22 through -27

Mr. Barry L. Valentine
Acting Administrator
Federal Aviation Administration
Washington, D.C. 20591

On October 2, 1996, at about 1112 eastern daylight time, a Piper PA-32-300, N2881W, crashed in a heavily wooded area in Brandywine, Maryland, about 2 miles south of its intended destination, the Washington Executive/Hyde Field Airport, Clinton, Maryland. The pilot and two passengers were killed, and the airplane was destroyed. At the time of the accident, instrument meteorological conditions (IMC) prevailed. The flight had originated in Somerville, New Jersey, and an instrument flight rules (IFR) flight plan had been filed for the personal flight conducted under Title 14 Code of Federal Regulations (CFR) Part 91.

Although the investigation is ongoing, thus far it has disclosed air traffic control (ATC) deficiencies that the National Transportation Safety Board believes require corrective action by the Federal Aviation Administration (FAA). As part of the investigation, Safety Board staff have reviewed recorded voice communications, recorded radar data, and the teletype printout of the automated radar terminal system (ARTS) III-A, and have interviewed the controllers.

At the time of the accident, the pilot was receiving ATC services from two radar controllers working the F-2 radar position at the Washington National terminal radar approach control (TRACON). One of them was a developmental controller receiving on-the-job training (OJT) under the direction of a controller who was fully certified in the facility. The recorded voice communications indicate that the pilot was issued an altitude of 1,600 feet, which is the lowest altitude that can be issued near the airport. Because there is no instrument approach to the airport, the pilot was provided vectors to the vicinity of the airport with the expectation that he would see the airport visually, cancel his IFR flight plan and land. However, before the accident, both Washington National Airport and Andrews Air Force Base were reporting weather conditions that indicated very low ceilings and reduced visibility, decreasing the likelihood that the pilot would see the airport. Interviews with the controllers indicated that they were both aware of the weather conditions.

On the tape recording of voice transmissions, the accident pilot advised the controller that because he could not observe the airport at his assigned altitude of 1,600 feet, he would be descending to an altitude of 1,000 feet. After the pilot stated that he would be descending to an altitude of 1,000 feet, the TRACON minimum safe altitude warning (MSAW) aural alarm could be heard in the background while another aircraft was being instructed to join the localizer at Washington National. During an interview with Safety Board investigators, the controllers stated that they did not hear the pilot's transmission and that they never observed the airplane at an altitude below 1,600 feet. A computer printout of MSAW data from the Washington National TRACON indicated that during the aircraft's subsequent descent, four general terrain warning MSAW alerts were generated within the Washington National TRACON; however, both the developmental controller and his instructor stated that they did not recall seeing or hearing any MSAW alerts when they were at the position. Also, other controllers and a supervisor, who was in training at a radar display located across the room from the F-2 radar position, stated that they did not recall hearing or observing any low altitude warnings before the accident.

During the investigation, the Safety Board's ATC investigator for this accident requested a tour of the radar room to observe the position that would have provided ATC services to the pilot of N2881W. During this tour, the investigator noted that the MSAW aural alarm speaker, located directly above the F-2 radar position, was covered with heavy paper taped in place with what appeared to be masking tape. This is the only MSAW speaker in the radar room. The purpose of the MSAW system is to provide an aural warning to controllers, in conjunction with a visual warning displayed on their radar displays, that an airplane may be in close proximity to terrain, obstructions, or another aircraft. After an MSAW alert is heard or observed, it is the controller's responsibility to issue a verbal warning to the pilot so that corrective action may be taken.

Interviews with supervisors and controllers at the Washington National TRACON disclosed that the MSAW speaker in the TRACON might have been covered with paper for several years; however, these personnel did not know whether anyone had ever been questioned about who had covered it or why. The TRACON supervisor, who was on duty at the time of the accident, acknowledged that the cover might have been put on the speaker to mute its volume. Also, facility technicians stated that they were unaware that a cover had been placed on the MSAW speaker. When they heard an MSAW alarm in the tower or TRACON, they assumed that the system was working properly. The technician who conducted the recertification of the ARTS III-A after the accident said that he did not test the aural MSAW alarm because there had been no request from air traffic management to do so. Full facility evaluations conducted earlier by FAA Headquarters, and other regional and local office staff reports, contained no entries that the MSAW speaker in the TRACON had been covered. Such evaluations are routinely conducted through on-site observation and monitoring of operational positions.

The Safety Board is concerned that this condition was unnoticed or unquestioned for so long. Accordingly, the Safety Board believes that the FAA should issue an urgent general notice (GENOT) to all affected air traffic managers directing them to conduct an immediate visual inspection and aural test of the MSAW speakers in their facilities to ensure that no devices have been placed over them that might hinder, mute, or prevent the aural warning from being heard in the operational quarters.

Further, the Safety Board believes that the FAA should require that a daily, visual inspection and aural test of the MSAW speakers located in the operational quarters be conducted by supervisory personnel prior to the start of each shift to ensure the integrity of the MSAW system. Also, these inspections should be recorded in the appropriate facility logs. Implementation of these recommendations should provide data to verify that the system is operating in the manner intended.

The Safety Board also believes that the FAA should require that all affected terminal personnel be briefed on the contents of this safety recommendation letter. This briefing should focus on generating awareness and vigilance in those situations in which a safety alert might occur and controllers must be prepared to respond, as directed in FAA Order 7110.65, "Air Traffic Control."

This accident is the second one that the Safety Board has investigated recently in which air traffic controllers have stated that they did not hear the MSAW alert immediately before the accident. On October 4, 1995, a Cessna C-172N, crashed while executing an instrument landing system (ILS) approach to the Elmira/Corning Regional Airport. The private pilot and his passenger were fatally injured. The local controller, who was in communication with the pilot, told Safety Board investigators that he neither saw nor heard an MSAW warning, although the MSAW speaker was located about 3 feet from his operating position. At that time, the controller had another airplane on his frequency. The supervisor on duty disclosed that he was 7 to 8 feet from the speaker when he heard the aural MSAW alert, and he heard the local controller asking the pilot if his aircraft was established on the localizer. A teletype printout of the ARTS-III system indicated that an MSAW alert occurred about 10 seconds prior to the local controller's inquiry to the pilot.

These examples indicate that some controllers are either failing to perceive, or are discounting, critical audio and visual safety alert information that may require their immediate response. In this accident, the radar controller who was responsible for the F-2 radar position stated that he did not hear the pilot advise that he would be descending to an altitude of 1,000 feet. However, the controller apparently did not miss other transmissions. Moreover, the position was sufficiently busy to warrant an almost continuous scan of the radar display. Given the aural and visual attentiveness required of the controllers at that time, the Safety Board is unable to understand how they could fail to note such vital and relevant safety cues as the MSAW warnings.

It is possible that controllers neither saw nor heard an MSAW alert because they had unconsciously "tuned out" these critical audio and visual cues. The Safety Board notes that in previous accident investigations, controllers have told investigators that their automated safety alert systems were alarming "almost constantly."

Also, the visual portion of an MSAW alert consists of a flashing "L/A" displayed in the automated datablock of the aircraft to represent a low altitude situation. However, in the course of their duties, radar controllers routinely effect automated handoffs on aircraft and once the handoff is accepted or received, the controller observes the datablock flash. Because controllers routinely observe datablocks flash, they may not be as attuned visually to the "L/A" flashing, requiring urgent response. The Safety Board believes that the FAA should require modifications to the MSAW system software to enhance the conspicuity of those aircraft that may require the controller's immediate attention and action. Such modifications might be accomplished by placing the target and datablock within a flashing circle.

The FAA recently announced that the Raytheon Corporation will supply new computers, displays and software for as many as 172 FAA approach control and tower radar facilities beginning in 1998 under the Standard Terminal Automation Replacement System (STARS). The Safety Board applauds this effort and strongly supports it. Further, the Safety Board believes that the FAA should require that the STARS program include: an MSAW speaker at each radar display; a capability for the controller to momentarily override and mute an MSAW alert; and a computerized recording of the muting of such an alert.

Finally, the Safety Board believes that the FAA should require, as a part of the STARS program, that MSAW alerts on IFR aircraft be duplicated at a position in the operational quarters designated for supervisory personnel and that the supervisor determine the validity of the alert and whether appropriate corrective action has been initiated or is required. This requirement would put supervisory personnel "in-the-loop" for those instances in which their assistance might be warranted.

Therefore the National Transportation Safety Board recommends that the Federal Aviation Administration:

Immediately issue an urgent general notice (GENOT) to all affected air traffic managers directing them to conduct an immediate visual inspection and aural test of the aural minimum safe altitude warning (MSAW) speakers in their facilities to ensure that no devices have been placed over them that might hinder, mute, or prevent the aural warning from being heard in the operational quarters. (A-97-22)

Require that a daily, visual inspection and aural test of the minimum safe altitude warning (MSAW) speakers located in the operational quarters be conducted by supervisory personnel prior to the start of

each shift to ensure the integrity of the MSAW system. Require that these inspections be recorded in the appropriate facility logs. (A-97-23)

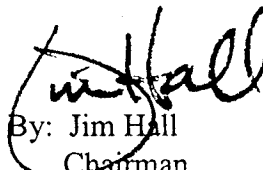
Require that all affected terminal personnel be briefed on the contents of this safety recommendation letter. This briefing should focus on generating awareness and vigilance in those situations in which a safety alert might occur and controllers must be prepared to respond, as directed in FAA Order 7110.65, "Air Traffic Control." (A-97-24)

Modify the software for the minimum safe altitude warning (MSAW) system to enhance the conspicuity of those aircraft that may require the controller's immediate attention and action. Such modifications might be accomplished by placing the target and datablock within a flashing circle. (A-97-25)

Require that the Standard Terminal Automation Replacement System (STARS) program include: a minimum safe altitude warning (MSAW) speaker at each radar display; a capability for the controller to momentarily override and mute an MSAW alert; and a computerized recording of the muting of such an alert. (A-97-26)

Require, under the Standard Terminal Automation Replacement System (STARS) program, that minimum safe altitude warning (MSAW) alerts on instrument flight rules (IFR) aircraft be duplicated at a position in the operational quarters designated for supervisory personnel and that the supervisor determine the validity of the alert and whether appropriate corrective action has been initiated or is required. (A-97-27)

Chairman HALL, Vice Chairman FRANCIS, and Members HAMMERSCHMIDT, GOGLIA and BLACK concurred in these recommendations.


By: Jim Hall
Chairman